REMARKS/ARGUMENTS

Claims 1-26 are original. Claims 27-30 are new and focus on embodiments where from 12wt% to 20wt% and/or from 12wt% to 18wt% are applied at the size press and contained by the coating layer. Support for the new claims is found at page 6, lines 16-25, of the originally filed application. No new matter is believed to be added by the amendment. Favorable reconsideration is respectfully requested in light of the Remarks below.

The rejections of Claims 1-26 under 35 U.S.C. §102 and/or 35 U.S.C. §103 over US Patent No. 6379497 (US'497); are traversed below. Further, Claims 27-30 are not disclosed or suggested by US'497.

US'497, at best, describes multiply paperboard material containing bulking agents, such as expandable microspheres, substantially distributed therein (See Column 5, lines 30-35). Further, US'497 discloses that the bulk-enhancing additive should also be porosity-enhancing and be additively controlled so as to be distributed throughout the thickness of paperboard and size press applied binder and increase the "openness" of the sheet (See Column 5, lines 37-42). Still further, the binder may be starch (see Column 18, lines 23-24). When starch is used at the size press, US'497 discloses that the starch solids should be increased from typical (9.8wt% size press applied starch solids) to between 20% and 40% solids starch (see Column 30, lines 3-6) so that the "openness" of the sheet allows penetration of the size press applied starch solids into the sheet (see Column 30, lines 10-14). In fact, US'497 teaches that because the bulking agents (i.e. expandable microspheres):

> *"increase the 'openness' of the resulting paperboard, there is increased penetration of the size-press solids which allows for a greater amount of size press starch to be retained within the paperboard"*(See Column 30, lines 10-14).

In direct contrast, the present invention relates, in part, to a paper or paperboard having improved bulk and stiffness containing a three layered single-ply *I-beam structure* having a top layer, a central layer and a bottom layer, and a bulking agent interpenetrated within the central layer, and optionally also *where the central layer is a cellulosic core layer, and the top and bottom layers are starch based, size-press applied coating layers that cover an upper and lower surface of the central layer with minimal penetration into the central layer* (See Claim 1). Further, the invention relates, in part, to methods of making and using the same (See Claim 16). Finally, the invention relates, in part, to methods and paper (or paperboard) where *the top and bottom layers are formed from 12 to 20wt% starch based, size-press applied coating layers that cover an upper and lower surface of the central layer with minimal penetration into the central layer.*

US'497 fails to disclose, much less suggest, the claimed invention because it fails to disclose and/or suggest the presence of an *I-beam structure* altogether. The Office has taken the position that an *I-beam structure* is disclosed by US'497. However, Applicants respectfully disagree as discussed below. The Office supports its position by directing Applicants' attention to column 39, line 19, of US'497. Here, US'497 states:

> *"In other words, the combination of a caliper increase and and increased moduli of elasticity on the paper is believed to generate an 'I-beam' effect that improves bending stiffness as shown in FIG. 15 and FIG. 5"*(See Column 39, lines 16-20).

Applicants respectfully disagree with the Office because an I-beam effect is not the same as an I-beam structure. In other words, US'497 does not disclose an I-beam structure, it merely concludes that the paper substrate behaves in a similar manner based upon data that "allegedly" supports such a conclusion. However, as discussed below, this data does not exist, especially in situations where higher than "typical" wt% starch solids are applied to paper substrates at the size press. Further, as discussed above, US'497 teaches away from an I-beam structure in situations where a paper substrate contains a bulking agent and higher than "typical" wt% starch solids, i.e. higher than 9.8wt%, is applied to paper substrates at the size press.

In addition, the above-mentioned conclusion that the paper substrate behaves in a similar manner in US'497 is only based upon experimental data that does not exist in the document at all. This experimental data relied upon to make this statement in US'497 is generated in Example 1 therein (see Column 37, line 3, to column 39, line 21). Example 1 allegedly compares the addition of expandable microspheres at different amounts, i.e. 0, 10, 20, and 40 lbs/ton (See Table I, lines 19-20), followed by the addition of either 32.7% or 9.8% size press applied starch solids (see Figs 12-15; column 37, lines 45-48; and column

38, lines 51-53). US'497 directs the reader to Figures 12 and 13 and states:

> *"The size press penetration and the size press pick up is depicted as a function of addition of expandable microspheres in FIGS. 12 and 13, respectively."*(See Column 38, lines 54-56).

However, Figures 12 and 13 contain no data points in which microspheres were added with high solids starch. In fact, only one data point is provided at 32.7% solids and that data point has absolutely no microspheres, and thus no bulking agent, added to the sheet. In other words, US'497 is absent any data whatsoever in Figures 12 and 13 in which microspheres were added to the sheet and 32.7% size press applied starch solids was administered thereto.

This theme of no data is common throughout Example 1 of US'497 as further discussed. Another example is the very data upon which US'497 relies to make the statement cited by the Office (i.e. no data exists) which follows:

> *"In other words, the combination of a caliper increase and increased moduli of elasticity on the paper is believed to generate an 'I-beam' effect that improves bending stiffness as shown in FIG. 15 and FIG. 5"*(See Column 39, lines 16-20).

First, Applicants direct the Office's attention to FIG. 5. Figure 5 has absolutely nothing to do with a bulking additive, much less the impact of a bulking additive on the Taber Stiffness of a paper substrate. In fact, FIG. 5 reports the Taber stiffness of paper substrates having various

densities with no bulking additive. Accordingly, the data in FIG. 5 can not possibly support the extension of the above statement to situations in which a paper substrate contains a bulking agent, let alone a bulking agent and size press applied starch solids of from 12wt% to 20wt%.

Second, Applicants respectfully directs the Office's attention to FIG. 15. However, Figure 15 contains no data points in which microspheres were added with high solids starch. In fact, only one data point is provided at 32.7% solids and that data point has absolutely no microspheres, and thus no bulking agent, added. In other words, US'497 is absent any data whatsoever in Figure 15 that demonstrates the paper performs as if it has "I-beam effect" and containing microspheres, let alone such a paper containing a bulking agent and size press applied starch solids of from 12wt% to 20wt%.

In summary of the above, the Office bases its rejection on the following statement provided in US'497:

> *"In other words, the combination of a caliper increase and increased moduli of elasticity on the paper is believed to generate an 'I-beam' effect that improves bending stiffness as shown in FIG. 15 and FIG. 5"*(See Column 39, lines 16-20).

However this statement in US'497 has no merit, especially to substrates containing a bulking agent because, as discussed above, FIG. 5 discloses no performance/physical data on paper substrates containing microspheres and FIG. 15 contains performance/physical data on paper

in which microspheres were added with size press applied starch solids of from 12wt% to 20wt%.

In addition, US'497 teaches away from an I-beam structure, and at the very least, teaches far away from a paper or paperboard containing a central layer that is a cellulosic core layer, and top and bottom layers that are from 12wt% to 18wt% starch based, size-press applied coating layers that cover an upper and lower surface of the central layer with minimal penetration into the central layer when the central layer contains a bulking agent. US'497 discloses that the bulk and porosity enhancing additives (i.e. microspheres) are added:

> *"in a controlled distribution throughout the thickness of the paperboard and size press applied binder"*(See Column 30, lines 10-14).

This disclosure clearly indicates that the bulk and porosity enhancing additives (i.e. microspheres) are substantially distributed throughout the size press applied binder as well as the paperboard. Therefore, US'497 clearly teaches that the bulk and porosity enhancing additives is not present only in the center layer, but in fact, substantially penetrates into the layer containing the size press applied binder. This teaching is in direct contrast to the definition of a I-beam structure. Accordingly, US'497 not only fails to disclose that its paperboard product contains an I-beam structure, it actually teaches away from an I-beam structure, especially when using higher than "typical" wt% size press applied starch. Accordingly, the claimed invention is neither disclosed, much less suggested by US'497.

Further evidence that US'497 teaches away from the claimed invention is evidenced by its disclosure that because the bulking agents (i.e. expandable microspheres):

> *"increase the 'openness' of the resulting paperboard, there is increased penetration of the size-press solids which allows for a greater amount of size press starch to be retained within the paperboard"*(See Column 5, lines 40-42).

This is the only reference to the relative positioning of a bulking agent and size press applied starch that can be found throughout US'497 and it discloses that it is most desirable to have the higher than "typical" (9.8wt%) size press applied starch penetrate the center layer core and therefore be retained within the paperboard. This disclosure certainly does not discuss a paper or paperboard containing an I-beam structure, much less that one containing a central layer that is a cellulosic core layer, and top and bottom layers that are starch based, size-press applied coating layers that cover an upper and lower surface of the central layer with minimal penetration into the central layer, is desirable. Accordingly, the present invention is neither disclosed nor suggested by US'497 because US'497 actually teaches away from the claimed invention and the allegedly inherent characteristics therein.

In summary, US'497 actually teaches away from an I-beam structure, especially when using higher than "typical" wt% of size press applied starch solids. At best, US'497 discloses a paper containing a bulking agent that performs as if it is an I-beam (i.e. having "I-beam effects"), but teaches the value of such a paper to have "openness" for increased high wt% size press applied starch penetration therein (i.e. does not contain an I-beam structure).

Finally, there is absolutely no support (and actually specific teaching away) in US'497 regarding a paper substrate having an I-beam structure, a bulking agent, and higher than "typical" wt% of size-press applied starch solids. Accordingly, withdrawal of these grounds of rejection is respectfully submitted.

Applicants respectfully submit that the present application is now in condition for allowance. Favorable reconsideration is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact below-signed by telephone.

Please charge the amount of **$450.00** required for the request for extension of time to our Deposit Account No. 09-0525. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 09-0525. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time.

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